

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-32, 34, 35, 37 and 38 are pending in the present application. Claims 1, 13 and 22 are amended and Claims 33, 36 and 39 are cancelled by the present amendment.

Claim amendments and new claims find support in the application as originally filed. Thus, no new matter is added.

In the outstanding Office Action, Claims 1-8, 11, 12, 22-26 and 29-31 were rejected under 35 U.S.C. §112, second paragraph, as indefinite; Claims 1-8, 11-26 and 29-39 were rejected under 35 U.S.C. §103(a) as unpatentable over Harvey et al. (U.S. 2004/0045934, herein "Harvey") in view of Willis (U.S. 2004/0004708) or Nutly (U.S. 5,045,149); and Claims 1-8, 11-26 and 29-39 were rejected under 35 U.S.C. §103(a) as unpatentable over Harvey in view of Koshimizu (U.S. 6,297,064).

Initially Applicants and Applicants' representatives wish to thank Examiner Chen for the interview with Applicants' representatives on February 6, 2007. During the interview the present invention and differences between the invention and the references in the outstanding Office Action were discussed in detail. Comments and claim amendments discussed during the interview are reiterated below.

With respect to the rejection of Claims 1-8, 11, 12, 22-26 and 29-31 under 35 U.S.C. §112, second paragraph, Claims 1, 11, 22 and 29 have been amended to overcome the rejection. Specifically, Claims 1 and 22 have been amended to recite "at least two filtered endpoint signals..." In addition, Claims 11 and 29 have been amended to correct the improper dependency. Accordingly, Applicants respectfully request that the rejections of Claims 1-8, 11, 12, 22-26 and 29-31 under 35 U.S.C. §112, second paragraph, be withdrawn.

Addressing now the rejection of Claims 1-8, 11-26 and 29-39 under 35 U.S.C.

§ 103(a) as unpatentable over Harvey and Willis or Nutly and the rejection of Claims 1-8, 11-26 and 29-39 under 35 U.S.C. § 103(a) as unpatentable over Harvey and Koshimizu, these rejections are respectfully traversed.

Amended Claim 13 recites, in part,

starting said process in a process chamber;  
measuring a first endpoint signal corresponding to a first chemical constituent found in the process chamber;  
measuring a second endpoint signal corresponding to a second chemical constituent found in the process chamber;  
determining a ratio signal from a ratio of said first endpoint signal and said second endpoint signal, said ratio signal comprises an endpoint transition;  
determining a differential signal from said ratio signal by applying a differential filter to said ratio signal, wherein said differential filter comprises a Savitsky Golay filter; and  
determining an endpoint of said process from said differential signal,  
wherein the first filtered signal corresponds to a first chemical constituent whose concentration decays during endpoint, and  
wherein the second filter signal corresponds to a second chemical constituent whose concentration rises during endpoint.

Claims 1 and 22 recite analogous features.

Harvey describes endpoint analysis in a plasma system that uses a single endpoint signal (see Fig. 13A) and applies a differential filter to the signal.

However, as acknowledged in the outstanding Office Action, Harvey does not describe or suggest measuring two endpoint signals or determining a differential signal from the ratio signal by applying a differential filter to the ratio signal.

Accordingly it follows that Harvey does not describe or suggest that the first filtered signal corresponds to a first chemical constituent whose concentration decays during endpoint and the second filter signal corresponds to a second chemical constituent whose concentration rises during endpoint.

However, the outstanding Action relies on Willis, Nutly and Koshimizu as curing the deficiencies of Harvey.

Willis describes a method of data handling, storage and manipulation for a plasma processing system. However, Willis is a §102(e) reference that was commonly owned at the time the invention was filed and according to 35 U.S.C. §103(c)(1) “[s]ubject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person.” Thus, Applicants have submitted a declaration stating that Willis and the present application were commonly owned. Accordingly, Applicants respectfully submit that the Willis reference is unavailable as a prior art reference.

Nutly describes a method and apparatus for detecting the endpoint in a plasma etching process. Further, Nutly describes etching away a first material until a second material is exposed without etching the second material. In addition, Nutly describes that spectra lines can indicate a chemical constituent in the plasma.

Similarly, Koshimizu describes a process of measuring the emission intensities of two gases over time and using these measurements to determine end point of the etching process.

However, as discussed in the interview, neither Nutly nor Koshimizu describes or suggests that the ratio of two filtered signals is used to determine the endpoint transition where the first filtered signal corresponds to a first chemical constituent whose concentration decays during endpoint and the second filter signal corresponds to a second chemical constituent whose concentration rises during endpoint.

Choosing specific chemical constituents, i.e. one with a decaying concentration at endpoint and one with a rising concentration at endpoint, provides a significant advantage, in

that, by choosing one rising and one decaying signal, any ratio calculated from these signals is provided with greatly improved signal to noise properties. As a result, a more accurate endpoint detection, and as a result a much better etch process, is achieved.

Accordingly, Applicants respectfully, submit that Claim 13 and similarly Claims 1 and 22 and claims depending therefrom patently distinguish over Harvey, Willis, Nutly and Koshimizu considered individually or in any proper combination.

Consequently, in light of the above discussion and in view of the present amendment the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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